

WE CLAIM:

1. An aerator apparatus for mixing a gas with a liquid having a surface comprising:
 - (a) a first motor having a shaft;
 - (b) a blower operatively connected to said first motor;
 - (c) a mixing chamber comprising an enclosing wall, said mixing chamber having a proximal opening and a distal opening;
 - (d) a bubble generator located within the mixing chamber, said bubble generator being operatively connected to said blower; and
 - (e) a second motor having a shaft operatively connected to a propeller; wherein said propeller is positioned to propel water into said proximal opening of said mixing chamber and out of said distal opening of said mixing chamber.
2. The aerator apparatus of claim 1 further comprising a diffuser adjacent to said distal opening of said mixing chamber.
3. The aerator apparatus of claim 1 further comprising a plurality of means to facilitate mixing of said gas and liquid.
4. The aerator apparatus of claim 3 wherein said means to facilitate mixing of said gas and liquid are a plurality of vanes positioned within said mixing chamber.
5. The aerator apparatus of claim 3 wherein said means to facilitate mixing of said gas and liquid are a plurality of louvered openings positioned in said enclosing wall of said mixing chamber.
6. The aerator apparatus of claim 1 wherein said mixing chamber includes a plurality of openings in said enclosing wall of said mixing chamber.
7. The aerator apparatus of claim 1 wherein said bubble generator comprises: at least one manifold perpendicularly attached to a main tube running the length of the bubble generator and a plurality of porous tubes.

8. The aerator apparatus of claim 1 wherein said blower is operatively connected at said proximal opening of said mixing chamber.
9. The aerator apparatus of claim 1 wherein said aerator apparatus is mounted in a floatable frame.
10. The aerator apparatus of claim 7 wherein said at least one manifold includes a proximal manifold and an intermediate manifold having a first section of porous tubes connected there between and an intermediate manifold and a distal manifold having a second section of tubes connected therebetween.
11. The aerator apparatus of claim 9 wherein said mixing chamber is substantially parallel to the surface of a liquid.
12. The aerator apparatus of claim 9 wherein said bubble generator is substantially parallel to the surface of a liquid.
13. The aerator apparatus of claim 7 wherein said main pipe is porous to a gas.
14. A method of diffusing a gas into a liquid to be treated comprising the steps of:
 - (a) mounting the aeration apparatus of claim 1 on a floatable frame to form an aeration assembly;
 - (b) disposing said aeration assembly in said liquid to be treated;
 - (c) blowing a gas into said bubble generator;
 - (d) rotating the propeller to induce the flow of a liquid by said propeller through said mixing chamber;
 - (e) diffusing a gas into said liquid; and
 - (f) propelling said liquid from said aeration apparatus.
15. The method of claim 14 wherein said liquid to be treated is water in a pond.
16. The method of claim 14 wherein said liquid to be treated is water in a column.
17. The method of claim 14 wherein said gas is ambient air.

18. The method of claim 17 wherein the standard oxygen transfer rate is $(K_{La20})(9.07)(V)(0.001)(2.205)$.
19. A system for efficiently aerating a pond or column of water comprising:
the aerator apparatus of claim 1 wherein said bubble generator is enclosed in a removable housing and said removable housing is removably attached to said mixing chamber.
20. The system of claim 19 wherein said removable housing includes a plurality of vanes projecting from said removable housing.